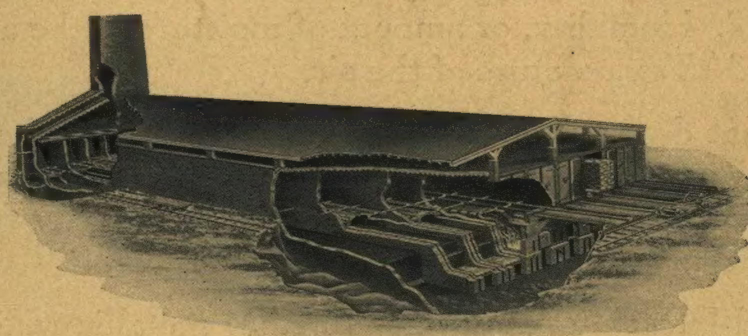
INTERNATIONAL DRYERS

BRICK - TILE - HOLLOWARE

AND

Other Products



DRYER CARS

Bulletin No. 40

International Clay Machinery Co.

DAYTON, OHIO, U. S. A.

Pittsburgh, Pa. New York Toronto, Ont., Canada

DRYING CLAY WARE

The drying of clay products by artificial means is just as efficient as the dryer is designed to approach nature's method of drying by the sun's rays.

Air is the drying medium, whether drying is accomplished by the sun or in tunnels; and all drying is controlled by three air factors:

1. Speed, or velocity of the air.
2. Humidity, or amount of moisture in the air.
3. Temperature of the air.

That dryer which is so designed as to give the most complete control and co-ordination of these three factors, will give a better product, and a larger capacity for the size of dryer at the least cost per unit of ware.

All International dryers, whether metallic radiation, radiated heat, or waste heat, are the product of many years of experience in drying-problems; and with them is obtained such an accurate control of drying factors that thousands of tunnels in all parts of the world are drying everything from tender roofing tiles, through hollow tile, plaster board, fine face brick and insulating board, to the common clay products such as building and paving brick.

In practically every clime, wherever modern clayworking has been instituted, there you will find International installations.

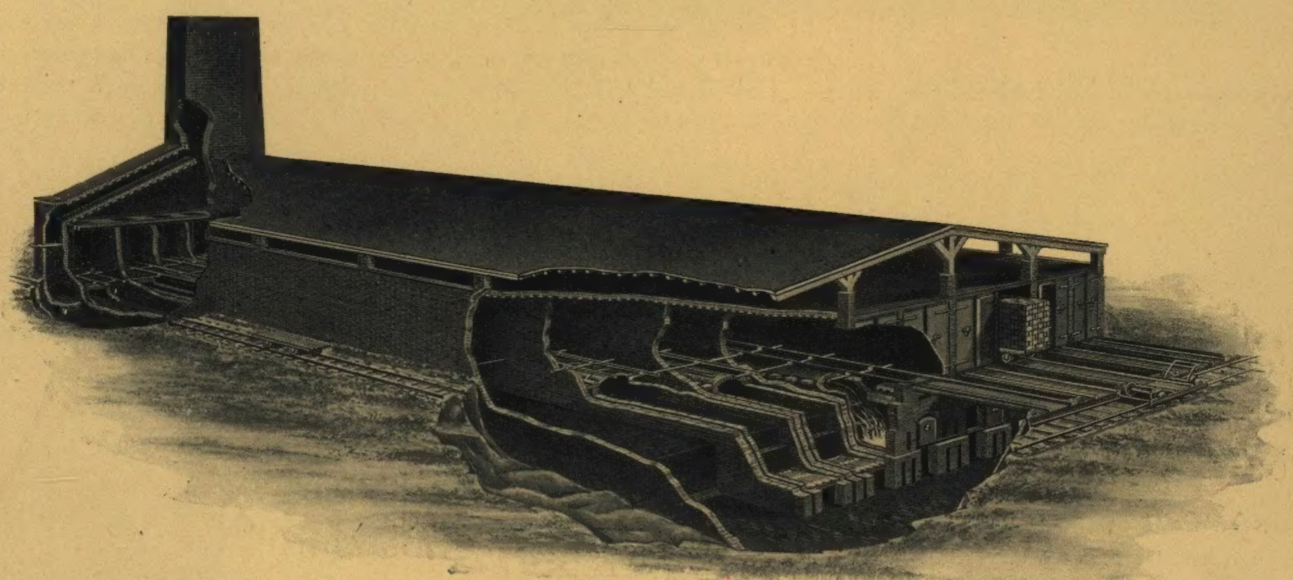
INTERNATIONAL METALLIC RADIATION DRYER

This is the most prevalent of all International Dryers. Our new improvements in radiation area make it a most efficient installation for the general run of plants other than those of very large capacity where color of ware is not a decided factor. In these latter cases International waste heat systems are most efficient.

FUEL—International dryers are operated mostly with coal, but many use gas and oil and some of them even wood. That fuel which is most economical from an ultimate cost standpoint is recommended for use.

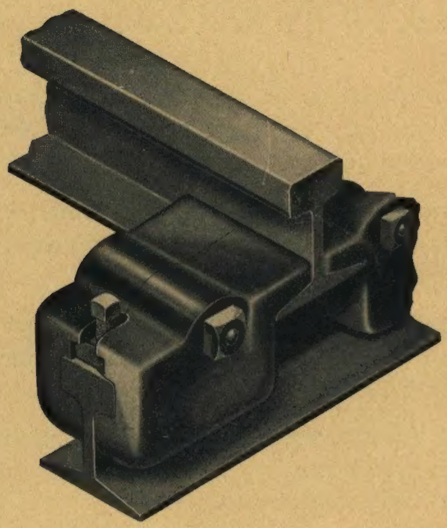
FURNACES—International dryers are generally built with a furnace under each tunnel, which furnace empties into a smoke flue traversing the length of the tunnel under the track. This smoke flue empties into the stack at the cool end.

The air passages around the furnaces are so designed as to take up the maximum amount of radiation from the furnace walls, they not being obstructed with baffles, etc., which would tend to slow down the air circulation, hence cutting down the amount of heat carried away into the dryer in a given time.



Between the furnace proper and the smoke flue is a reservoir which catches any soot formed and slows up the combustion gases at the proper place, allowing these combustion gases to radiate a maximum amount of heat. The dust chamber has a wicket at the bottom which permits the operator to rake out the soot through the ash chamber of the fire box.

On plants where the ground water level is too high to permit the use of the firing pit because of resultant seepage, a large furnace is placed at one side of the dryer, its products of combustion being led to each tunnel smoke flue by one or more cross flues at the hot end of the dryer, which cross flues run across the hot end under the tracks from the outside furnace. Dampers placed in the intersections of the tunnel flues with the cross flue give an excellent control to each individual tunnel.



INTERNATIONAL
RAIL CLAMP

TRACKAGE—All tracks in the dryer are made of industrial rail held securely by means of rail clamps to rail cross ties, which cross ties run the width of the dryer (standard 3 feet apart) embedded in each dryer wall where they pass through, so that each track is in the same plane with every other track, all remaining in original alignment for the life of the dryer.

RAIL CLAMPS—These, you will note from the cut, are so designed not only to clamp securely to the rail used as a cross tie, but are further fastened to this rail by means of a set screw bearing down on the rail, all of which keeps the track rails from spreading, yet allowing them to move lengthwise as they may be affected by heat or cold.

STACK—International metallic radiation dryers require no fans for operation on account of a very efficient stack design. The waste combustion gases from the smoke flues are syphoned into the stack before they mingle with the water-laden drying air, thus giving a hot stack and a good draft, hence requiring no fan.

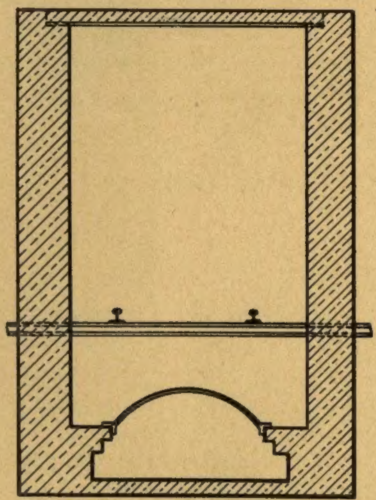
Stacks are either built symmetrical, or where additions are contemplated by the customer, in many cases one-half of the ultimate stack capacity is first built so that when the other half of the dryer is completed, the stack will then be symmetrical.

SMOKE FLUE—These lie under the track in each tunnel leading from the furnace at the hot end of the dryer to a cross tunnel at the cool end of the dryer, which cross tunnel connects with the stack.

In the average International design, this smoke flue is built in three sections: first a brick flue leading from the furnace to a point approximately one-fourth the length of the dryer; second, a metal covered radiation flue extending from the end of the brick flue to approximately 15 feet from the cool end of the dryer; third, a brick covered flue joined to the radiator flue and emptying into the cross tunnel at the cool end of the dryer. (See line drawing, page 6.)

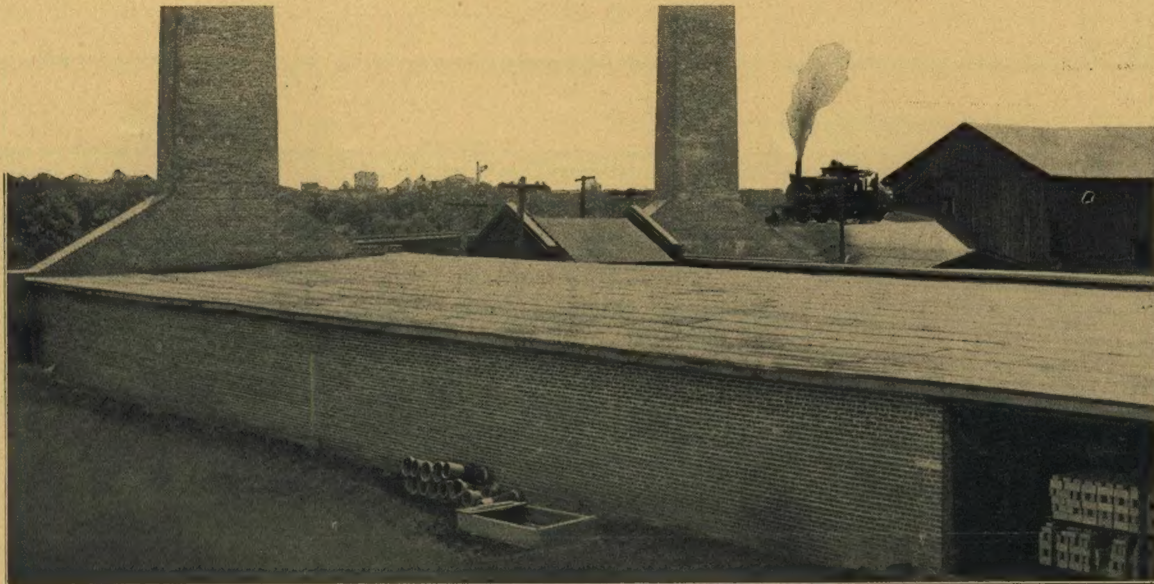
THE BRICK FLUE leading from the furnace to where the radiators begin is usually made of fire brick arched over, having spaces between it and the walls of the tunnel in order that the drying air may be admitted to the tunnel alongside this flue.

THE RADIATOR SECTION is shown in cross-section at the right. Please note that this radiator flue is made up of the tunnel walls themselves stepped out to make a firm resting-place for the radiator, which radiator covers the top. This construction gives a flue of larger cross-section than is possible with a separate flue not a part of the tunnel walls. All of this slows up the flow of the burned gases, allowing them to radiate their heat with the greatest possible efficiency.



Section AA
Showing Metallic Radiators

Much is gained by this type of construction as compared with a flue separate from the tunnel walls, as no spaces are present to continually fill up with broken brick or tile, while the walls holding the radiators can be kept smoke-tight, which would be impossible if the smoke flue had two vertical 4-inch side walls.



International metal radiators are 26 inches wide, and each radiator is 30 inches long (photo page 6) and is a finished job from a casting standpoint when compared with other radiators on the market.

Radiator joints are sealed with asbestos cord and held together with clips. Each radiator has flanges running continuous of its length fitting down inside of the smoke flue walls, besides each radiator has a flat section where it rests on the smoke flue walls. This permits a smoke-tight joint.

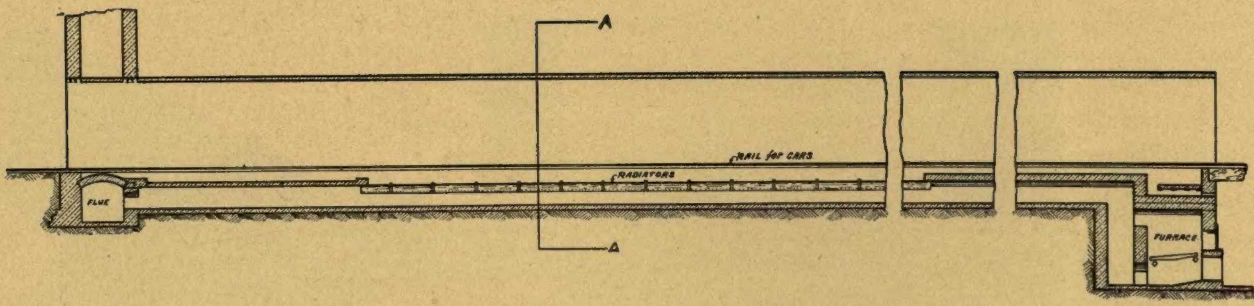
Please note the high angle of curvature of International radiators, which curvature gives the greatest possible radiation surface for its width.

International patented curved radiators, along with our smoke flue construction before detailed, permit more radiation per foot of radiator length than any other design of radiation type of dryer on the market.

THE BRICK FLUE leading from the radiator section to the cross flue at the cool end of the dryer, is shown in section on page 6. It is built on the same plan as the radiator section but is covered with brick laid flat, which brick are supported by flue bars. Here is also given the greatest possible radiation per foot length of smoke flue.

GENERAL DETAILS

Note the large air space between the bottom of the cars and the top of the smoke flue, which with a small space between the loaded cars and the tunnel walls causes the drying air to pass under the cars toward



Longitudinal Section of Each Tunnel

the exit and gradually percolate up through the ware, hot air having a tendency to rise. Such a construction causes the drying air to pass through the ware and not to rush immediately to the top of the tunnel upon entering it, hence a more even and a more economical drying.

DRYING

The successful drying of clay ware depends entirely on the atmospheric conditions in the tunnels holding the ware.

When a tender clay, made up into brick, tile or hollow-ware, is placed in a warm, dry atmosphere, it will invariably check.

This is due to the fact that the quick drying of the outside of the ware causes uneven shrinking conditions.

On the other hand, if a tender clay is heated up thoroughly in an atmosphere near the point of saturation before any drying takes place, the temperature then can be gradually raised and drying carried on without injury to the ware, for, as one might say, the ware dries from the inside first.

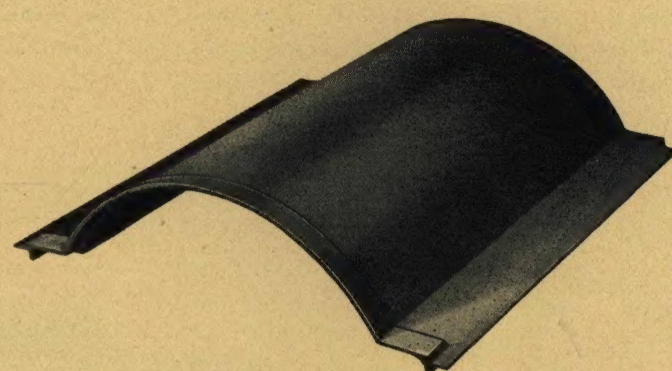
The air inlets and outlets of the dryer are adjustable to the extent that practically any atmospheric condition required can be obtained in the tunnel, practically any condition from saturation at the receiving end to an almost uniform temperature from end to end of each tunnel.

FUEL CONSUMPTION

Dryers are regularly evaporating from four to six pounds of water per pound of good bituminous coal, or in common brick measure, many plants are using from 200 to 250 pounds of good bituminous coal per 1000 brick, or from 60 to 90 pounds of good bituminous coal per ton of hollow tile.

In one particular case where a heat balance was run on an International Producer Gas Metallic Radiation Dryer, drying face brick, a fuel consumption of only 150 pounds per 1000 brick was noted.

The exact amount of fuel required on any particular plant depends on many factors,, but with attentive operation and good fuel, the first paragraph figures can be taken as a close approximation.



INTERNATIONAL RADIATOR

Notice angle construction of Radiator at sides and arrangements for asbestos cord sealing at ends. A smoke-tight radiator is the result.

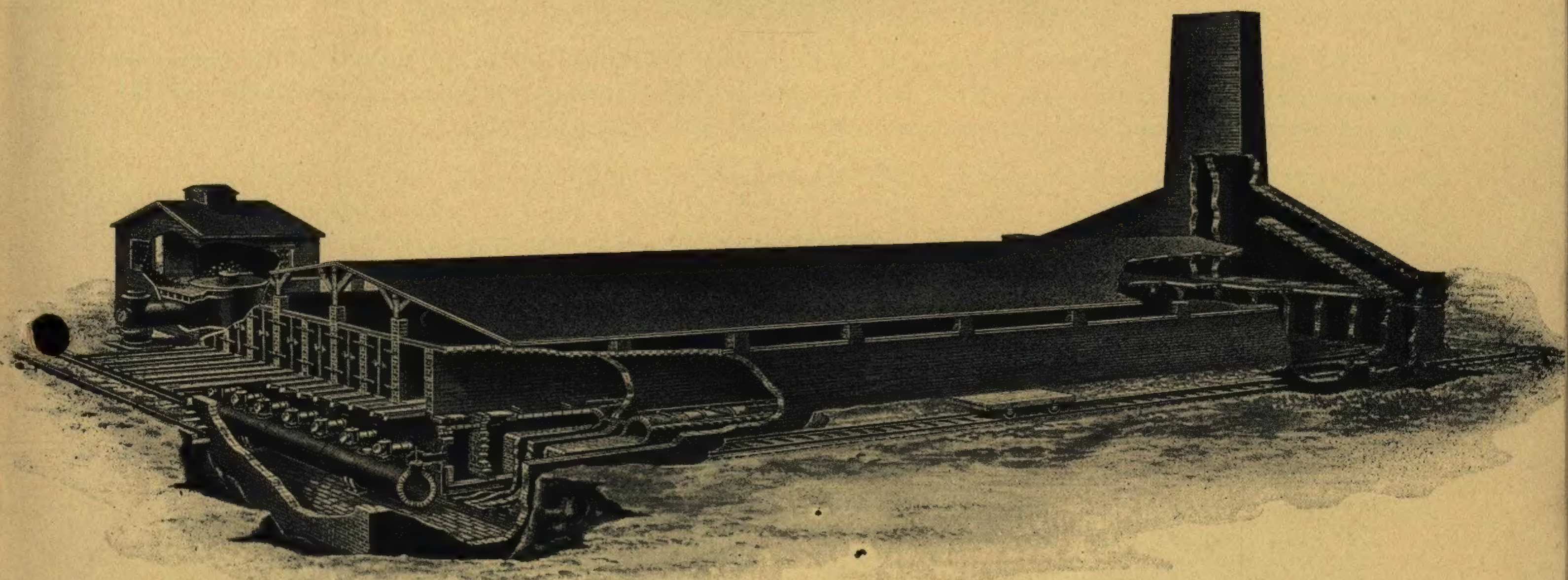
SUMMARY

Summing up, an International Metallic Radiation Dryer excells in:

1. Economy in fuel cost.
2. Ability to thoroughly control the atmospheric conditions in the tunnels.
3. It does not scum.
4. It is not hard on cars.
5. It requires no fan.
6. Has a small maintenance cost.
7. Its initial cost is not excessive.
8. It is more uniform in operation.
9. It requires no insurance.
10. Does away to the greatest possible extent with the human element.

Where is there another modern dryer so fitted for your work?

INTERNATIONAL PRODUCER GAS FIRED METALLIC RADIATION DRYER



This type of metallic radiation dryer we believe will dry clay products more efficiently and at less cost than any other type of dryer now used in the industry.

Direct fired dryers using coal as a fuel, have from four to eight times as much air passing through the grates, as is needed to burn the coal.

This amount of air is necessary for the fuel when it is first thrown on the grates, but as the fire assumes a coking condition, the air supply is far in excess of that needed.

Producer gas, on the other hand, can be burned with from one and one-half to two times the amount of air needed to combust the fuel.

Again, an International Producer Gas Fired Dryer is so arranged as to preheat the air for combustion, producer gas burning best with preheated air.

Thus a great saving in fuel is brought about through this type of dryer needing less air for cumbustion, saving the heating up of from two to three times as much air as is necessary to combust the fuel in direct fired furnaces.

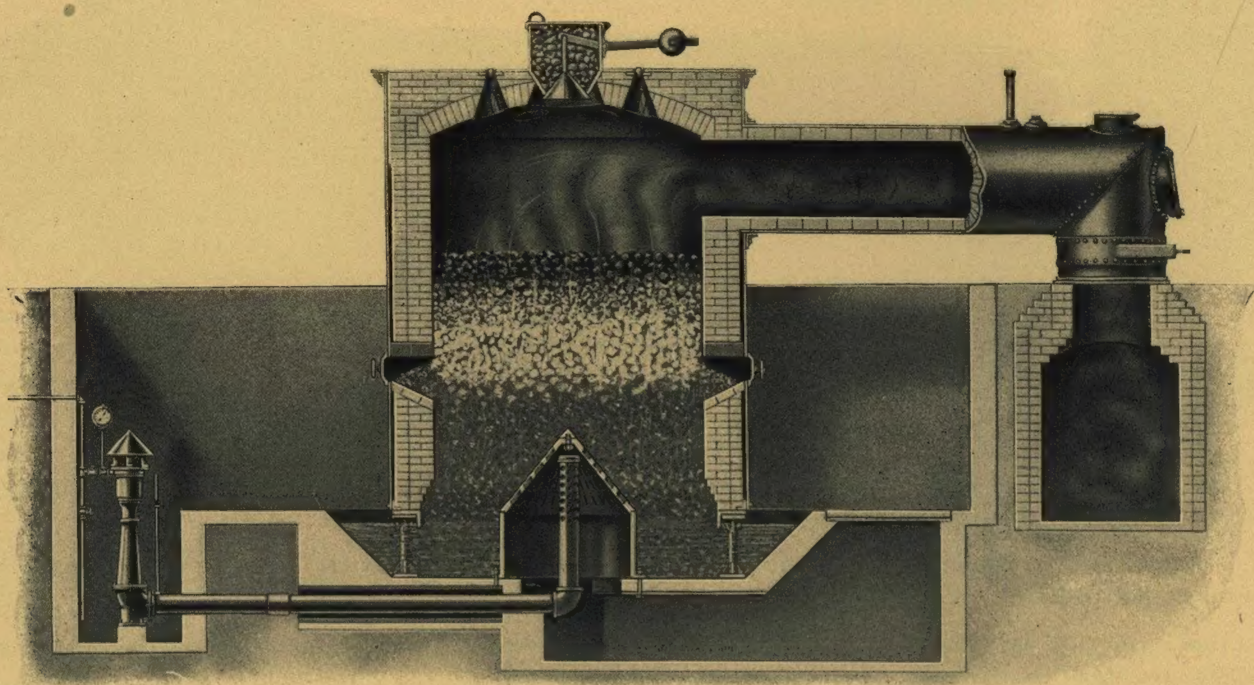
The gas producer used in connection with International dryers is our standard circular pressure type as per illustration below, which producer has found more use in the clay-working industry than probably all other producers combined.

Being circular and of the pressure type, it is simple in operation yet by test very efficient, and has been designed especially for the problems confronting ceramic plants.

International burners are of our own design, so constructed as to operate on the stack draft and the producer pressure, the dryer requiring no separate air blowers with resultant piping and no power for fan operation, etc.

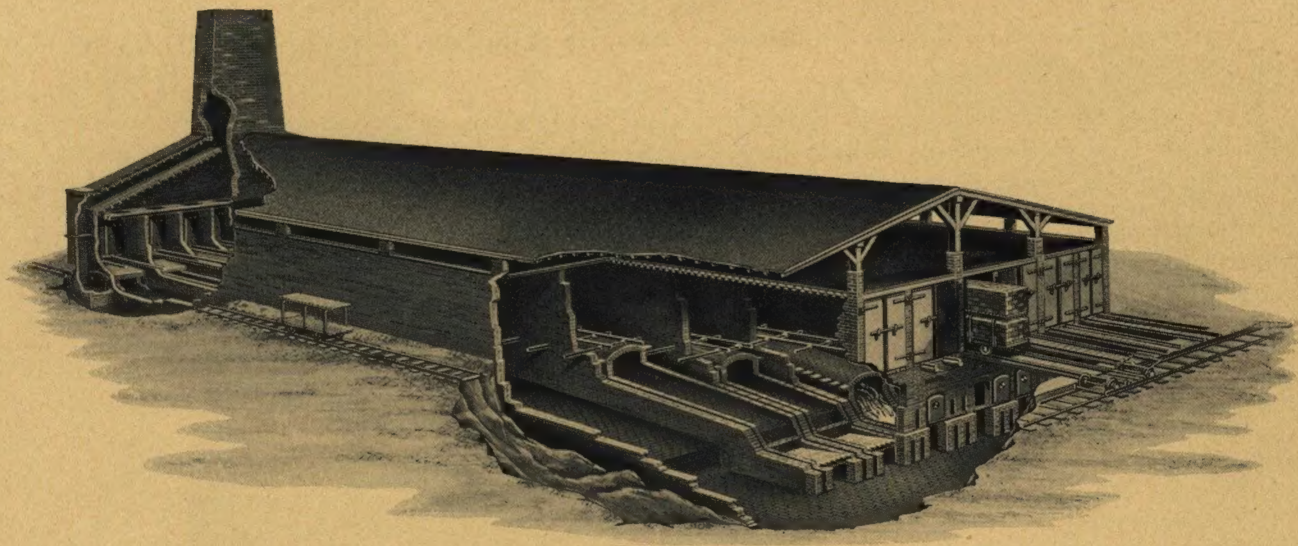
International Dryers require no fans. Remember that a 12-foot fan working against ¾-ounce pressure, requires approximately 50 horsepower to drive it and must be operated continually for 24 hours a day.

With gas for fuel, it is easier to maintain uniform heat conditions within the tunnels as the operation is almost mechanical. In fact, this dryer has so many exclusive features that it is being used with remarkable success in the plaster board, gypsum and other industries.



INTERNATIONAL TYPE A PRESSURE GAS PRODUCER

RADIATED HEAT DRYERS



Some few clays are too tender in drying to safely and efficiently use a metallic radiation dryer, and for those clays an International Radiated Heat Dryer is recommended.

The Radiated Heat Dryer is built in a similar manner to the Metallic Radiation, but contains no metal radiation plates, the smoke flue being covered with brick laid on the supporting flue bars running from the cross flue at cold end to a point where the arched over fire brick flue, leading from the furnace ends.

SPECIAL DRYER

For exceedingly tender materials, and those where calcination is a factor, such as wall board, other gypsum and like products, we have installed dryers similar in construction to a metallic radiation, with the exception that the air for drying enters at the cold end instead of the hot end.

It passes under a floor built of brick on the flats supported by flue bars, which floor is built over the radiation flue close under the tracks. At the hot end the air enters the tunnel proper through suitable openings in the floor, the dryer operating from then on as a regular International dryer.

INTERNATIONAL WASTE HEAT DRYER

Many large plants making a product unaffected by scum, and burning with not less than eight to ten periodical kilns, can use a Waste Heat Dryer with economy.

An International Waste Heat Dryer requires but one fan, thus saving considerable on your power bill.

"Why but one fan?" you ask.

The dryer is built to fit the car when fully loaded, with minimum space between the top and sides of the car and tunnel.

The air is caused to circulate freely under the cars by means of an air space under the track running the length of the tunnel.

The tendency of hot air is to rise. As the air runs along underneath the car, it percolates up through the brick, not rising immediately to the top of the tunnel as in many dryers without this air space.

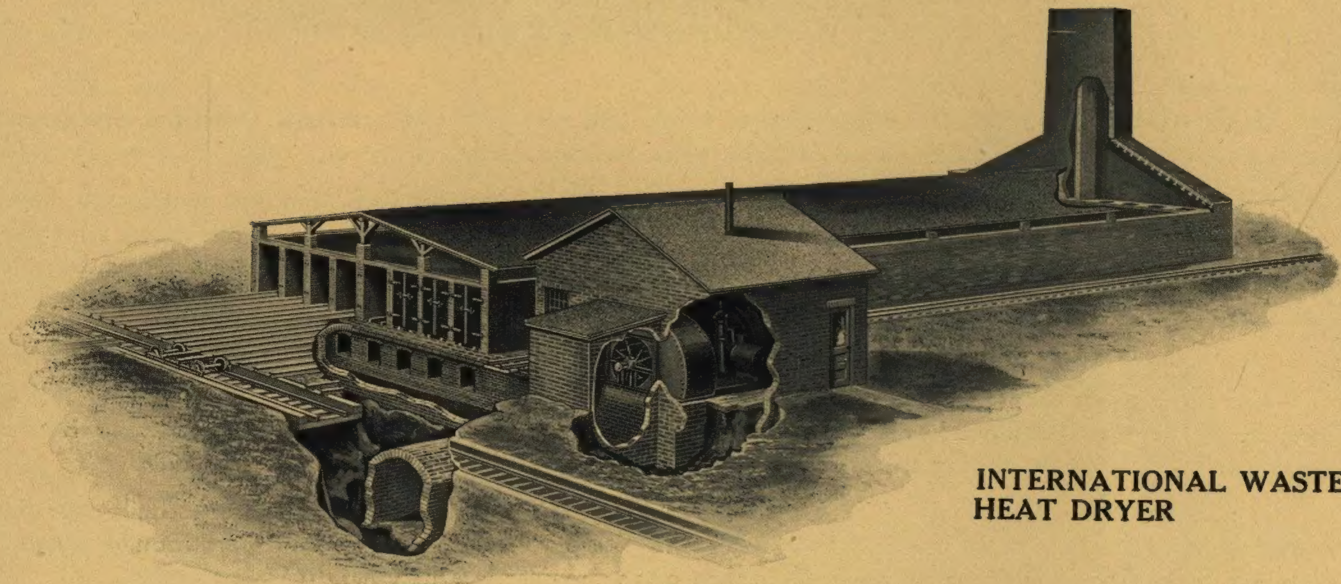
The hot air is forced by the one fan through a cross flue at the hot end of the dryer into the individual flues under each tunnel.

The individual flues have suitable openings in their top to allow the hot air to enter the tunnel proper while one or more of these flues run the entire length of the tunnel under the track (the remainder run part of the length), emptying into the stack in a similar manner to our International Metallic Radiation dryer, all of which gives a hot stack.

Most of the hot air is therefore forced through the flue perforations into the tunnels proper where it mingles with the ware, but the small amount entering the stack direct saves the use of a second fan.

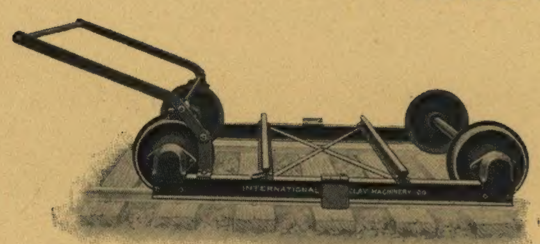
Dampers in the hot air flues and in the stack allow a perfect control of temperature and the atmospheric conditions in the tunnels themselves.

Where is another type of Waste Heat Dryer so simple and economical?



INTERNATIONAL WASTE HEAT DRYER

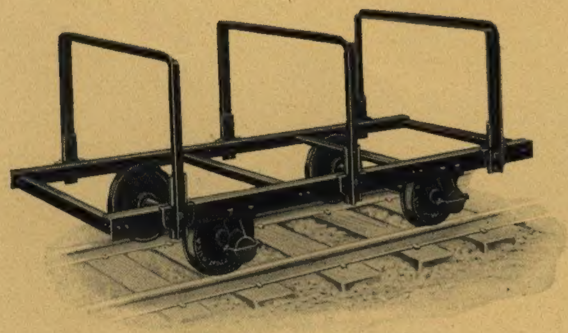
TRANSFER CARS



SINGLE TRANSFER—TYPE 194

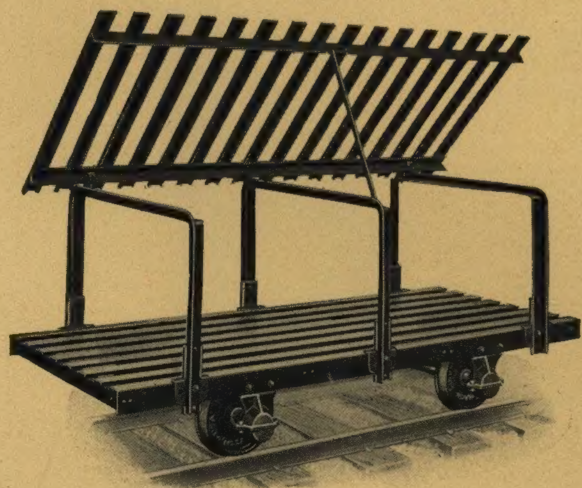
DOUBLE TRANSFER—TYPE 193

DRYER CARS

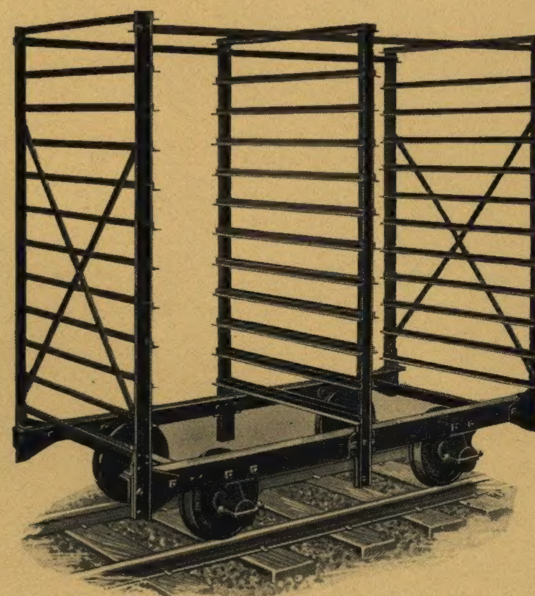


STYLE "C"

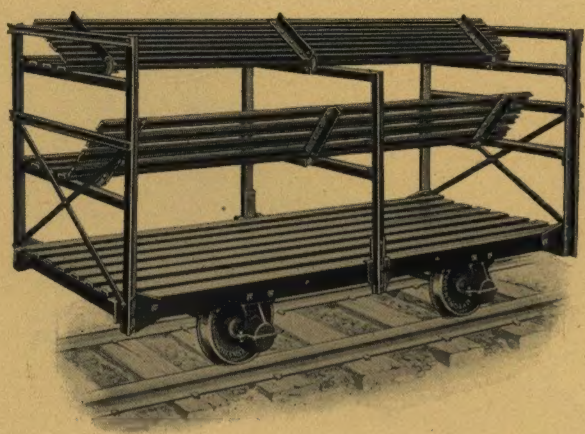
STYLE "R"—HEAVY DUTY



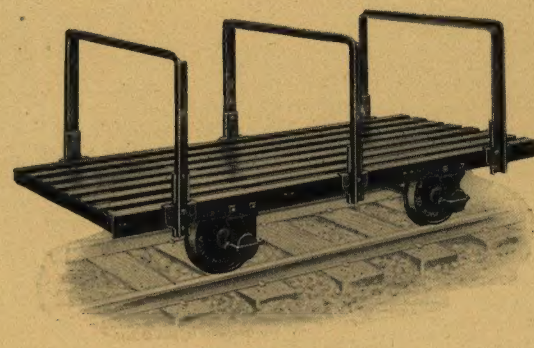
STYLE "G"



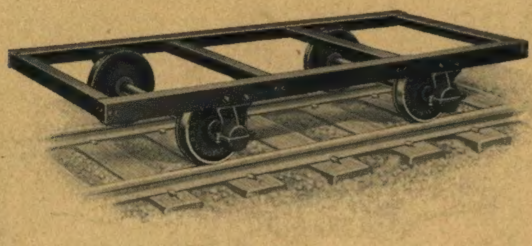
STYLE "F"



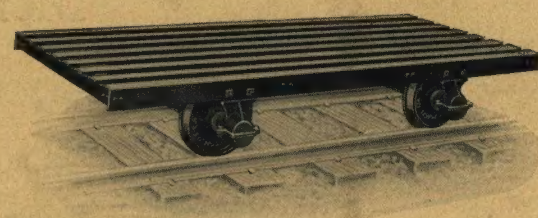
STYLE "O"



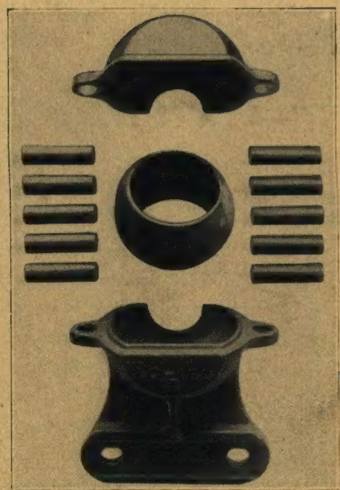
STYLE "E"



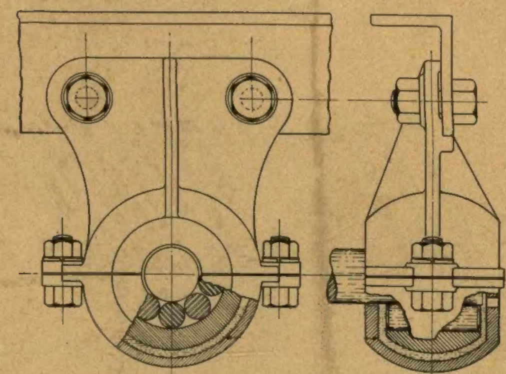
STYLE "A"



STYLE "B"



Detail of New Dryer Car Oil Reservoir Self-Adjusting Bearing.



SPECIFICATIONS

Code Word	Car	Length Overall	Width Overall	Height Overall	Height from top Rail to top First Deck	Length of Upper Deck	Width of Upper Deck	Width of Lower Deck	Distance, top of Lower Deck to top of Middle Deck	Distance, top of Midde Deck to top of Upper Deck	Standard Distance between Pallets	Length for Pallets	Height from Rail to Top First Pallet Angle	Diameter of Wheel	Width of Tread on Wheel	Approximate Weight
SINGLE DECK CARS																
Pidam	A	83″	38″	12¼″	12¼″			35″						11″	2¼″	251
Piden	B	83″	38″	12¼″	12¼″			35″						11″	2¼″	325
DOUBLE DECK CARS																
Pidip	C	83″	38″½	31¼″	12¼″			35″						11″	2¼″	306
Pidus	E	83″	38″½	31¼″	12¼″			35″						11″	2¼″	377
Pidor	G	83″	38″½	33¼″	12¼″	6′ 9″	35″	35″						11″	2¼″	490
Piemt	R	83″	36″	35¾″	12¼″	80⅜″	35″	35″						11″	2¼″	600
Pierx	J	83″	38½″	35½″	13″	6′ 10¼″	35″	35″						11″	2¼″	867
TRIPLE DECK CARS																
Piesy	M*	83″	38½″	54¾″	12¼″			35″	16½″	18½″				11″	2¼″	463
Pietz	M§	83″	38½″	54¾″	12¼″			35″	16½″	18½″				11″	2¼″	378
Piehn	O	83″	38½″	54¾″	12¼″	6′ 10½″	35″	35″	17″	18½″				11″	2¼″	687
PALLET CARS																
Piejp	F	75″	36″	5′ 8″	12¼″						4¾″	34¼″	13½″	11″	2¼″	475
Piels	P	68¼″	3′ 6″	5′ 8″	12¼″						4 ″	30¼″	12½″	11″	2¼″	880

*Slat bottom deck only. §No decks.

International Clay Machinery Company

Dayton, Ohio, U. S. A.

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